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Ecological survey of the vegetation of the proposed Bald Mountain (Station Creek) Research Natural Area, El Dorado National Forest, California

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Abstract

Bald Mountain is located on the south side of the canyon of the South Fork of the American River approximately 16 km west of Echo Summit. A portion of the north slope of Bald Mountain (adjoining the American River) is being considered for classification as a Research Natural Area by the Forest Service, U.S.D.A. This report describes the ecological setting and characteristics of the proposed RNA.

INTRODUCTION

Location. The proposed Bald Mountain (Station Creek) Research Natural Area is located in the eastern portion of El Dorado County, California, on the western slope of the Sierra Nevada (120°12'W, 38°47'N) (See Maps 1 and 2). The area is administered by the Eldorado National Forest, and includes portions of Sections 21, 22, 23, 26, 27, and 28 of T11N,R16E. As initially proposed, the boundaries of the area encompass a small area, only 182 ha (vertical projection), ranging in elevation from 1630 to 1950 m.

Area Boundaries. The following boundaries were suggested in a letter dated May 20, 1974, from Samuel D. Hall of the Forest Service in Placerville (in reply to 4060 Research Facilities). The lower (north) boundary of the area is formed by the South Fork of the American River. Summer home sites and a small campground border the river opposite the proposed RNA. The west boundary is formed by an unnamed drainage to the northeast of Bald Mountain, which emanates from the higher peak about 2 km east of Bald Mountain (see Map 2). The eastern boundary has arbitrarily been drawn along the section line between the Sections 22 and 23. The upper boundary corresponds approximately to the 6400' (1050 m) contour.

To insure the integrity of the area, the eastern boundary should be extended eastward to Station Creek, and the south boundary should be raised to approximate the 6800' (2072 m) contour, enclosing an area of approximately 270 ha.

Area Name. The proposed name for the area is the Bald Mountain RNA. Bald Mountain, however, is a commonplace name, which could be confusing, as there are several other "Bald Mountains" in this region. Additionally, the name might be taken to imply that the proposed RNA encompasses a "bald," which is an ecologically distinct habitat characteristic of low-elevation maritime mountains. Consideration of an alternative name for the area should be given. Station Creek is one acceptable alternative.

Physiography. The area is located on the South Fork of the American River. This portion of the river canyon was probably not glaciated during the last (Tioga) ice advance, but it most likely was covered, in part, by ice of the Tahoe stage (approximately 60,000 to 75,000 years BP). For the most part the slopes of the area are uniformly steep (30 to 40°), with major rock outcrops in a few places. Slopes face mostly north to northeast.

Regional Climate. There are no U. S. Weather Bureau stations in the immediate vicinity of the Bald Mountain area. Total precipitation at Wright's Lake, 8 km to the northwest and 180 m higher, averages 1468 mm annually. The nearest recording station to the west is at Placerville, 1400 m lower. Lapse rate projections from Placerville along the west slope of the Sierra predict an annual precipitation for the Bald Mountain area of about 1300 mm, with a mean annual temperature of 5.3°C. Snow is

probably on the ground for up to two months duration in typical years at the upper elevations in the area, and for a lesser period at the lowest elevations.

Geology and Soils. The entire proposed RNA is underlain by Mesozoic granodiorite. The area has not been included in any recent soil surveys. Soils of the Bald Mountain area are of variable depth, and are probably related to the Cagwin-Toem association of the nearby Lake Tahoe basin. Soils of these series are excessively drained loamy coarse sands and gravelly coarse sands that develop from granodiorite. These soils support dense stands of conifers.

VEGETATION

Survey Methods. We visited the Bald Mountain site on 29-30 June 1976. After an initial inspection of the area, it was decided that very few plots would be needed to depict adequately to variation in the vegetation, since the forest cover of the area is particularly homogeneous. Thus, we sampled only 12 plots. Each plot was located subjectively, and all plant species within a predetermined area (315 to 700 m^2) were enumerated. DBH was recorded for each individual taller than 1.5 m for all tree species.

Plant Associations. Table 1 provides the plot data collected on the Bald Mountain plots. The data have been arranged to group associated species and similar stands. The values for species abundance, which appear in the table, translate as follows:

R = rare, few individuals

+ = less than 1% cover, numerous individuals

1 = 1-5% cover

2 = 5-25% cover
3 = 25-50% cover
4 = 50-75% cover
5 = more than 75% cover

From these data, and from the senior author's additional field work in the area, we recognize the following two plant associations (Table 1):

A. Pinus lambertiana-Abies concolor association (plots 12,10, 8,1,3,4,9,2,7)

B. Abies concolor-Goodyera oblongifolia association (plots 11, 5,6)

A. Pinus lambertiana-Abies concolor association.

This forest type is not represented by a SAF type designation, but is essentially transitional between Ponderosa Pine - Sugar Pine - Fir (SAF 243) and White Fir (SAF 211). Pinus ponderosa reaches its upper elevational limit in the canyon of the South Fork of the American River about 200 m lower than the Bald Mountain area. The Pinus lambertiana-Abies concolor association is a constant, geographically widespread forest type on the ecotone between the mixed coniferous and fir forests of the Sierra. Site index for Pinus lambertiana is probably highest in this zone. This has not been commonly recognized in either the botanical or the forestry literature, because widespread early logging activity preferentially removed Pinus lambertiana from this type, leaving most stands harvested, and with secondary successional vegetation.

Structurally, this association is generally open. Pinus lambertiana and Abies concolor canopy coverage is variable, but mostly in the 50 to 75% range. Important associate trees are Calocedrus decurrens and Pseudotsuga menziesii. The latter taxon often reaches immense stem diameters (to 3 m DBH).

Castanopsis sempervirens is a constant understory shrub covering generally less than 5% of the ground. Where disturbance from fire is evident, Quercus vaccinifolia and Salix scouleriana become important (cf. plots 9, 2, 7).

Table 2 summarizes the data from the 9 plots sampled in this type. Pinus lambertiana had a mean basal area of 61.8 m^2/ha on the sampled plots, and Abies concolor had a mean basal area of 39.9 m^2/ha. Pseudotsuga menziesii was important in only 3 of the 9 plots. Most of the 9 plots exhibited high densities of Abies concolor reproduction (less than 1.5 m tall), with stem density for this species averaging over 950 stems/ha. These high Abies concolor densities may be indicative of a successional trend due to decreased fire frequency in recent times, but critical studies are lacking in this regard.

B. Abies concolor-Goodyera oblongifolia association.

Stands 5, 6, and 11 are typical of this association. Regionally, this type forms a matrix with the Pinus lambertiana-Abies concolor community. On a microscale, Abies concolor predominates where snow cover is deeper, either from topographic position (snow accumulation sites) or slope exposure (northeast facing slopes). Pinus lambertiana is excluded from such sites.

Structurally this type is characterized by a dense, completely closed Abies concolor canopy. Pinus lambertiana seedlings are usually present, but only rarely are older individuals present. The understory in this type is sparse, with less than 5% total cover. The epiparasites Corallorhiza maculata and Pleuricospora fimbriolata are generally restricted to this type. We sampled 3 plots in this type, the data from which are summarized in Table 3.

Forest Cover Types. Map 3 is reproduction of the unpublished Vegetation Type Map (Quadrangle 55A3) for the Bald Mountain area from the files of the Pacific Southwest Forest and Range Experiment Station in Berkeley. The Bald Mountain area is outlined. The lower slopes of the area were mapped as SDW, and the upper slopes as SW, SWRApCs, SWR, CsCco, and SJWAp. The symbols key as follows:

S = sugar pine

D = Douglas-fir

$\hat{W}$ = white fir

$\hat{R}$ = red fir

J = Jeffrey pine

Ap = Arctostaphylos patula

Cs = Castanopsis sempervirens

Cco = Ceanothus cordulatus

RECOMMENDATIONS AND CONCLUSIONS

The Bald Mountain (Station Creek) site is ideally suited for RNA status, since 1) it is located on the important transition between the species-rich, cool, moist mixed conifer forest of middle elevations in the Sierra, and the species-poor, cold, moist montane forests, and 2) it supports old-growth stands of Pinus lambertiana and Abies concolor, as well as Pseudotsuga menziesii at its upper elevational limit.

We recommend that the following items be considered in the

final establishment report: 1) the name for the area, for clarity, might be changed to Station Creek Research Natural Area; 2) boundaries for the area should include the approximately 270 ha area outlined on Map 2. The latter recommendation is essential for the ecological integrity of the area, and protects an area of sufficient size to be suitable for ecological studies on a community scale.

PLANT SPECIES LIST

A total of 111 species of vascular plants were observed on the site. None of these are considered rare or endangered (California Native Plant Society, Special Publ. No. 1, 1975, Inventory of Rare and Endangered Vascular Plants of California; Federal Register 41(117), pp. 24524-24592, 16 June, 1976).

Species list for the Bald Mountain candidate Research Natural Area, El Dorado County, California. Number to the right of each taxon is the page number in Munz and Keck's A California Flora where the taxon can be referenced.

1.	ACERACEAE	
1	Acer glabrum	995
2.	AMARYLLIDACEAE	
2	Allium campanulatum	1371
3.	APOCYNACEAE	
3	Apocynum pumilum	451
4.	ASPIDIACEAE	
4	Athyrium filix-femina var californica	43
5	Cystopteris fragilis	43
5.	BETULACEAE	
6	Alnus tenuifolia	900
6.	BORAGINACEAE	
7	Hackelia nervosa	563
8	H. mundula	563
7.	CAMPANULACEAE	
9	Campanula prenanthoides	1063
8.	CAPRIFOLIACEAE	
10	Lonicera conjugialis	1051
11	Symphoricarpos acutus	1049
9.	CARYOPHYLLACEAE	
12	Sagina saginoides var hesperia	278
13	Silene lemmonii	290

10. COMPOSITAE

14	Adenocaulon bicolor	1239
15	Antennaria geyeri	1262
16	Artemisia ludoviciana	1236
17	Chrysopsis breweri	1170
18	Eriophyllum lanatum var. integrifolium	1146
19	Hieracium albiflorum	1305
20	Senecio integerrimus var. major	1248
21	S. triangularis	1248

11. CORNACEAE

22	Cornus nuttallii	1035
23	C. stolonifera	1034

12. CRUCIFERAE

24	Arabis holboellii var. retrofracta	262
25	A. platysperma	265
26	Erysimum capitatum	268

13. CUPRESSACEAE

27	Calocedrus decurrens	59

14. CYPERACEAE

28	Carex bolanderi	1443
29	C. microptera	1444
30	C. multicostata	1448
31	C. rossii	1450

15. EQUISETACEAE

32	Equisetum arvense	28

16. ERICACEAE

33	Arctostaphylos nevadensis	422
34	A. patula	423

17. FAGACEAE

35	Chrysolepis sempervirens (Castanopsis s.)	902
36	Quercus kelloggii	903
37	Q. vaccinifolia	907

18.	FUMARIACEAE	
38	Dicentra formosa	203
19.	GRAMINEAE	
39	Bromus marginatus	1407
40	Deschampsia elongata	1513
41	Elymus glaucus	1505
42	Festuca occidentalis	1478
43	Panicum occidentale	1546
44	Poa bolanderi	1484
45	Sitanion hystrix	1506
46	Stipa californica	1533
20.	HYDROPHYLLACEAE	
47	Phacelia hydrophylloides	527
21.	JUNCACEAE	
48	Juncus chlorocephalus	1410
49	J. ensifolius	1412
50	Luzula comosa	1413
22.	LABIATAE	
51	Monardella odoratissima ssp. glauca	714
23.	LEGUMINOSAE	
52	Lotus grandiflorus	845
53	Lupinus latifolius	827
54	L. polyphyllus ssp. superbus	828
24.	LILIACEAE	
55	Lilium humboldtii	1343
56	L. pardalinum	1344
57	Smilicina racemosa var. amplexicaulis	1331
25.	LORANTHACEAE	
58	Arceuthobium campylopodium	990
26.	ONAGRACEAE	
59	Epilobium glaberrimum	931
60	Gayophytum diffusum ssp. parviflorum	958

27. ORCHIDACEAE

61	Corallorhiza maculata	1400
62	Goodyera oblongifolia	1399
63	Listera convallarioides	1398

28. PINACEAE

64	Abies concolor	49
65	A. magnifica	50
66	Pinus lambertiana	52
67	P. jeffreyi	54
68	P. ponderosa	53
69	Pseudotsuga menziesii	57

29. POLYGONACEAE

70	Eriogonum nudum var. deductum	352
71	Polygonum phytolaccaefolium	364

30. PORTULACEAE

72	Montia parviflora	301

31. PTERIDACEAE

73	Pteridium aquilinum var. pubescens	32

32. PYROLACEAE

74	Chimaphila menziesii	435
75	Pleuricospora fimbriolata	436
76	Pterospora andromedea	436
77	Pyrola picta	434
78	P. p. ssp. dentata	434
79	Sarcodes sanguinea	436

33. RANUNCULACEAE

80	Aquilegia formosa var. truncata	105
81	Delphinium glaucum	86
82	Thalictrum sparsiflorum	106

34. ROSACEAE

83	Amelanchier pallida	793
84	Chamaebatia foliolosa	781
85	Holodiscus microphyllus	759
86	Prunus emarginata	789
87	Rubus parviflorus	785

35. RUBIACEAE

88	Galium bifolium	1041
89	G. bolanderi	1042
90	G. triflorum	1040
91	Kelloggia galioides	1045

36. RHAMNACEAE

92	Ceanothus cordulatus	978

37. SALICACEAE

93	Populus trichocarpa	910
94	Salix scouleriana	918

38. SAXIFRAGACEAE

95	Boykinia elata	732
96	Heuchera rubescens var. glandulosa	743
97	Mitella pentandra	740
98	Ribes roezlii	753
99	R. montigenum	750
100	R. viscosissimum var. hallii	748
101	Saxifraga punctata ssp. arguta	734

39. SCROPHULARIACEAE

102	Mimulus guttatus	616
103	M. moschatus	610
104	Pedicularis semibarbata	658
105	Penstemon azureus	638
106	P. newberryi	640
107	Veronica serpyllifolia var. humifusca	655

40. UMBELLIFERAE

108	Ligusticum grayi	1014
109	Osmorhiza chilensis	1009

41. VIOLACEAE

110	Viola glabella	185
111	V. purpurea ssp. mesophyta	187

TABLE 1.

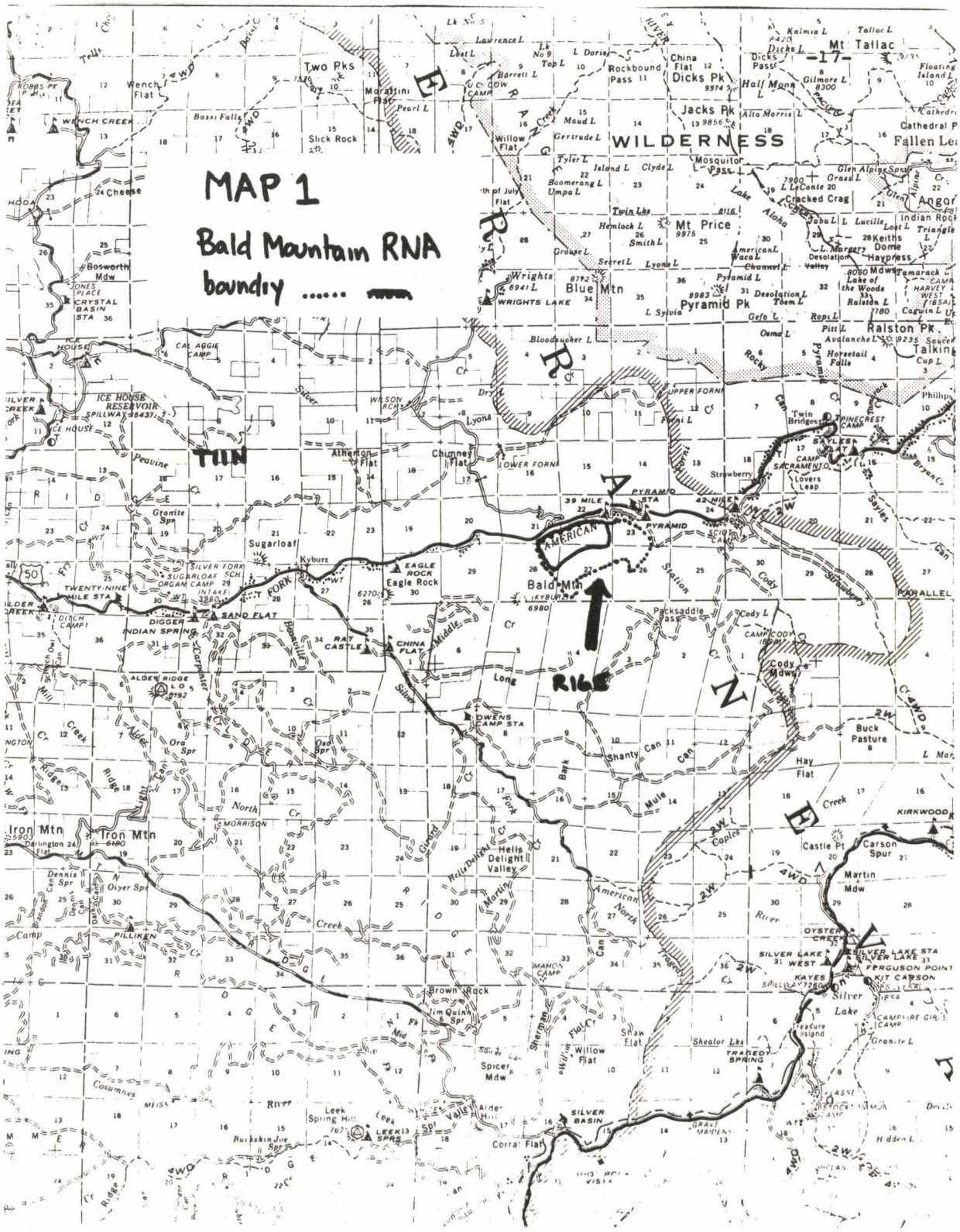
	A						B			A		
	BALD	BALD	BALD	BALD	BALD	BALD	BALD	BALD	BALD	BALD	BALD	BALD
	12	10	8	1	3	4	11	5	6	9	2	7
ELEVATION ABOVE 1000 m CONTOUR	734	895	819	712	642	658	783	712	731	871	627	776
SLOPE	22°	33°	35°	15°	25°	26°	17°	19°	23°	40°	33°	33°
EXPOSURE	NNE	NNW	NNE	N	NNW	N	NNW	NNE	NNE	N	NNW	NNE
Abies concolor	2	3	4	3	4	4	5	5	5	3	3	2
Pinus lambertiana	2	3	3	1	3	3	+	+	R	2	3	3
Calocedrus decurrens	+	1	.	.	+	1	+	1	.	1	+	.
Castinopsis sempervirens	1	+	+	1	1	+	+	R	+	+	1	2
Symphoricarpos acutus	+	.	+	+	.	+	.	.	+	+	+	+
Pyrola picta	+	+	+	+	+	+	.	+	.	+	+	+
Smilicina racemosa amplexicaulis	+	+	.	R	+	+	.	+	+	+	+	+
Hieraclum albiflorum	+	.	+	+	+	+	+	.	.	+	+	+
Pedicularis semibarbata	+	+	.	+	+	.	.	.	.	.	.	.
Apocynum pumilum	+	+	.	+	+	.	+	.	.	.	+	+
Galium bolanderi	+	+	+	.	.	.	+	.	.	.	+	+
Carex rossii	.	+	+	+	+	.	.	.	.	1	+	.
Carex multicaulis	.	+	+	R	.	R	.	.	.	+	.	.
Arceuthoubium campylopodium	.	+	+	.	.	.	+	+	+	.	.	.
Chrysopsis breweri	.	.	.	+	+	+	+	+	+	.	.	.
Adenocaulon bicolor	.	.	.	+	+	+	.	.	.	1	1	.
Pteridium aquilinium pubescens	.	.	.	+	+	+	+	.	2	.	1	1
Goodyeria oblongifolia	.	.	.	.	+	+	+	+	+	+	.	.
Quercus vaccinifolia	1	+	+	.	.	.	.	.	R	+	.	2
Galium triflorum	.	.	.	.	.	.	.	+	+	+	+	+
Rubus parviflorus	.	.	.	.	+	.	.	.	+	+	R	+
Salix scouleriana	.	.	.	.	.	.	.	.	R	+	1	+
Abies magnifica	.	+	.	.	+	.	+	.	.	.	.	.
Silene lemmonii	+	.	.	+	.	.	.	.	.	.	.	+
Acer glabrum	.	+	.	.	.	R	.	.	.	+	.	.
Kellogia galioides	.	.	.	.	+	+	.	.	.	.	+	.
Corallorhiza maculata	.	.	+	.	.	.	+	+	+	.	.	.
Amelanchier pallida	.	.	.	.	+	.	.	+	.	.	+	.
Pseudotsuga menziesii	2	.	.	3	.	.	.	.	.	.	3	.
Pinus jeffreyi	2	.	.	.	.	.	.	.	.	.	.	.
Arctostaphylos nevadensis	1	.	.	.	.	.	.	.	.	.	.	.

Table 2.
Tree density and dominance data for 9 plots of Pinus lambertiana-Abies concolor vegetation from the proposed Bald Mountain (Station Cr.) Research Natural Area, El Dorado National Forest, Calif.

Species	PLOT NUMBER 1	2	3	4	7	8	12	9	10	GRAND MEAN
A. Basal Area (m^2/ha)										
Pinus lambertiana	1.1	34.6	107.0	74.5	95.8	70.3	28.9	117.0	25.9	61.8
Abies concolor	21.4	28.4	21.2	50.6	64.9	91.1	26.5	2.0	53.7	39.9
Pseudotsuga menziesii	55.9	34.6	-	-	-	-	52.6	-	-	15.7
Calocedrus decurrens	-	0.4	-	0.2	0.2	-	-	11.7	4.4	1.8
Abies magnifica	-	-	0.9	-	-	-	-	-	-	-
Pinus jeffreyi	-	-	-	-	-	-	19.7	-	-	-
TOTALS	77.1	98.1	129.1	125.4	161.1	161.4	127.9	131.4	84.2	121.6
B. Density (stems/ha)										
Pinus lambertiana	70.7	132.6	132.6	31.8	63.6	88.4	32.4	222.8	44.2	91.0
Abies concolor	1046.8	685.2	3183.0	1655.2	700.2	530.5	227.3	795.7	176.8	966.7
Pseudotsuga menziesii	56.5	132.6	-	-	-	-	16.2	-	-	22.8
Calocedrus decurrens	-	66.3	-	127.3	31.8	-	-	31.8	22.1	31.0
Abies magnifica	-	-	22.1	-	-	-	-	-	-	-
Pinus jeffreyi	-	-	-	-	-	-	16.2	-	-	-
TOTALS	1174.2	1016.8	3337.8	1814.3	795.7	618.9	292.3	2005.3	2113.1	1111.5
C. Mean Stem Diameter (cm ± Coef. Variation %)										
Pinus lambertiana	4.4 ±50%	24.5 ±195%	61.3 ±144%	68.2 ±30%	134.0 ±26%	84.4 ±76%	104.1 ±31%	37.7 ±207%	86.3 ±8%	67.2 ±62%
Abies concolor	10.1 ±141%	9.0 ±156%	8.3 ±350%	10.5 ±120%	21.4 ±147%	34.5 ±94%	18.5 ±189%	15.4 ±125%	52.3 ±50%	20.0 ±118%
Pseudotsuga menziesii	99.5 ±13%	43.6 ±94%	-	-	-	-	-	-	-	15.9 ±370%
Calocedrus decurrens	-	8.4 +45%	-	4.1 +68%	-	-	-	-	-	1.2 +250%

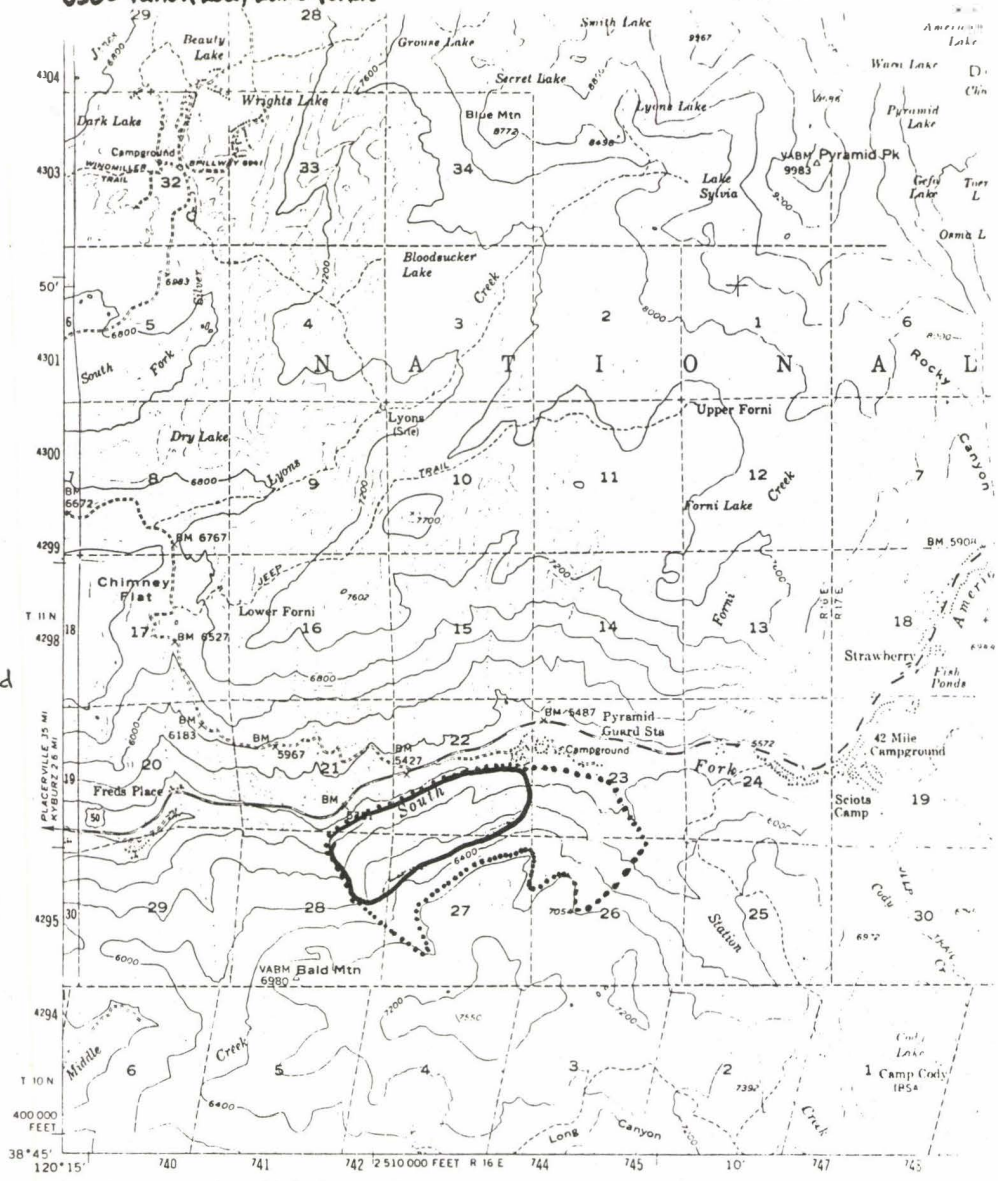
Table 3.
Tree dominance and density data for 3 plots of Abies concolor-Goodyera oblongifolia vegetation from the proposed Bald Mountain (Station Creek) Research Natural Area, El Dorado National Forest, California.

Species	PLOT NUMBER 5	6	11	GRAND MEAN
A. Basal Area (m^2/ha)				
Abies concolor	126.2	129.9	20.2	92.1
Calocedrus decurrens	12.9	-	1.7	4.8
Abies magnifica	-	-	1.6	0.5
TOTALS	139.2	129.9	23.6	97.4
B. Density (stems/ha)				
Abies concolor	906.2	954.9	1016.8	959.3
Calocedrus decurrens	110.5	-	44.2	51.5
Abies magnifica	-	-	22.1	7.3
TOTALS	1016.8	954.9	1083.1	1018.1
C. Mean Stem Diameter (cm ± Coef. Variation %)				
Abies concolor	26.2 ±113%	23.4 ±150%	26.4 ±97%	25.3 ±118%
Calocedrus decurrens	19.3 ±193%	-	21.5 ±41%	13.6 ±113%


MAP 1
Bald Mountain RNA
boundry .....
Bald Mtn
WILDERNESS
Mt Tallac
Two Pks
Dicks Pk
Jacks Pk
Mt Price
Pyramid Pk
Blue Mtn
Ralston Pk
Iron Mtn
Tiin
Ridge
Creek
Lake
Meadow
Valley
Spring
Flat
Peak
Mountain

USGS Fallen Leaf Lake Quad.

MAP 2



Potential Boundry indicated on El Dorado N.F. Proposal

Boundry herein recommended

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Compiled in 1958 from 1:24 000 scale maps of the Emerald Bay, Rockbound Valley, Pyramid Peak, and Echo Lake quadrangles, surveyed in 1955

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1955

Hydrography compiled from USC&GS chart 5001 (1953

Polyconic projection. 1927 North American datum
10 000 foot grid based on California coordinate system zone 3

1000-meter Universal Transverse Mercator grid ticks, zone 10, shown in blue

Dashed land lines indicate approximate locations

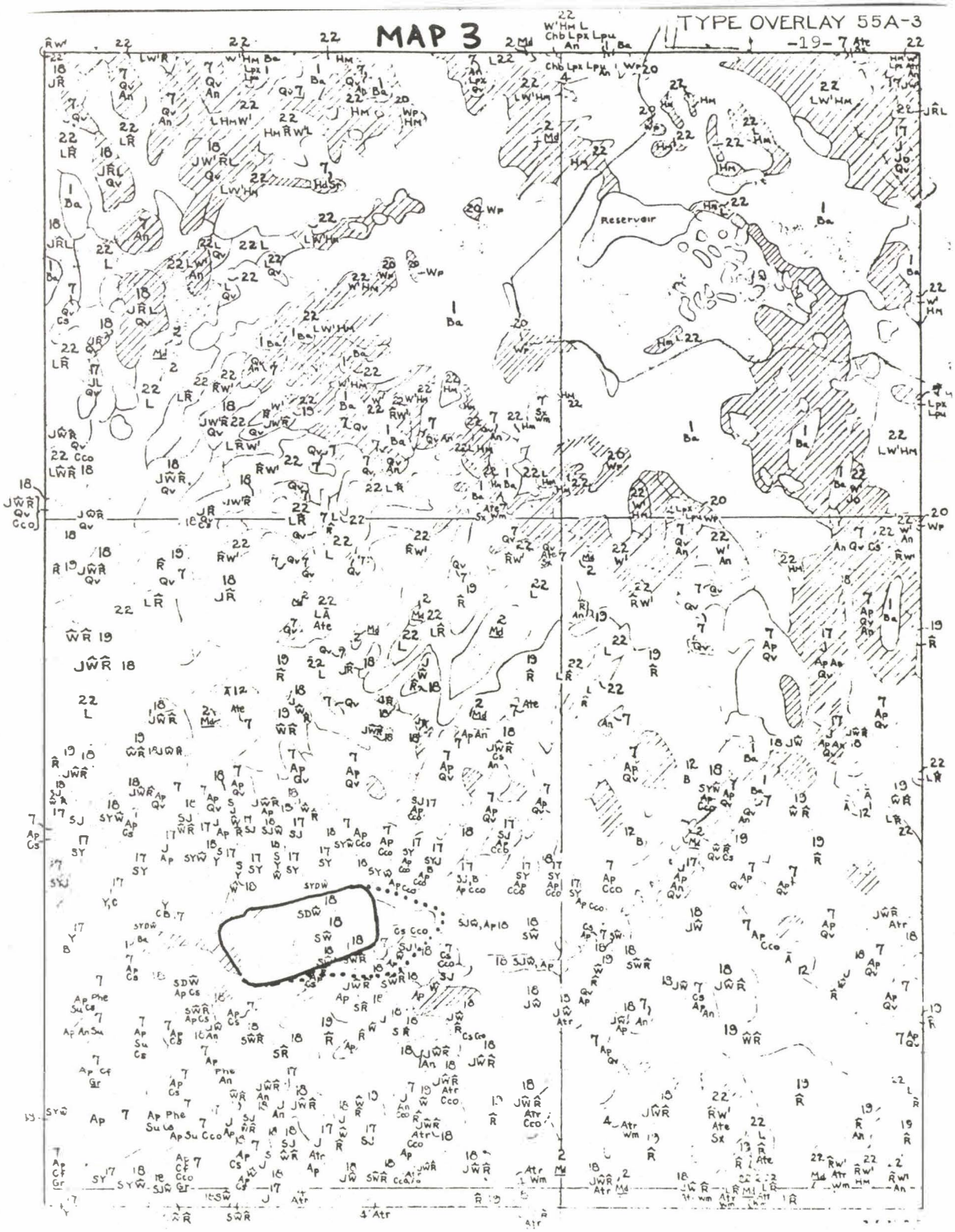
Uncontrolled elevations are shown in brown

FOR SALE BY U. S. GEOLOGICAL SURVEY

Recommended

MAP 3

TYPE OVERLAY 55A-3



ILLUSTRATIONS

a photo from Cub Cr. report 1963

Figure 1. Dense, young stand of Abies concolor under Pinus lambertiana-Abies concolor canopy, typical of the Bald Mountain site.

Figure 2. Open Pinus lambertiana-Abies concolor forest on the Bald Mountain site. Large individual of Pseudotsuga menziesii was 2.4 m DBH.